

sites contain only one essential binding site for the initiator, the origin recognition complex (ORC). Coster and Diffley now show that both helicases are loaded by a similar mechanism. Efficient loading requires binding of two ORC complexes to two ORC binding sites in opposite orientations. Natural origins were found to be partially symmetrical, containing functionally relevant secondary ORC sites. Sites can be flexibly spaced, but introducing an intervening “roadblock” prevented loading, suggesting that individual helicases translocate toward each other on DNA to form a stable double ring. —SMH

Science, this issue p. 314

SOFT ROBOTS

Reaching out as a way to grow

Humans normally think of motion as a physical shifting from one location to another. But for some plants, such as creeping vines, and even some cells, such as neurons, motion is accomplished by growth from a present location toward a desired one. Leveraging the flexibility that is possible with soft materials, Hawkes *et al.* used pneumatics to lengthen the tip of a robot over an extended distance. They inflated chambers on only one side of the robot to make it turn. An onboard camera connected to a feedback loop allowed the robot to track toward a distant light source. —MSL

Sci Robot. 10.1126/scirobotics.aan3028 (2017).

NEUROREHABILITATION

Greater gait with gravity

Often taken for granted, gravity—the force that keeps you on the ground—becomes a notable challenge during rehabilitation from injury. Mignardot *et al.* “harnessed” gravity, using a robotic body weight-supportive device to supply upward and forward forces to

the torso to assist with locomotion. Patients recovering from stroke or spinal cord injury demonstrated improved gait performance with the robotic harness. An algorithm was developed to adjust the forces provided by the robotic harness according to the patient’s needs. Nonambulatory patients were able to walk naturally with the harness, and ambulatory patients showed improved balance, limb coordination, foot placement, and steering. A clinical trial using this robot-assistive rehabilitation approach for patients with spinal cord injury is now under way. —CC

Sci. Transl. Med. 9, eaah3621 (2017).

BATTERIES

A stretchy binder protects the silicon

A challenge in using silicon particles for lithium batteries is that the large volume changes during charge-discharge cycling cause the particles to fracture, which builds up an insulating interface layer. Choi *et al.* show that traditional binder materials used to cushion the silicon particles can be improved by adding small amounts of polyrotaxanes (see the Perspective by Ryu and Park). The molecules consist of multiple rings that are strung along a linear segment and stoppered at each end. Some of the rings are anchored to the polymer binder, whereas others float freely, yielding a highly mobile but connected network that anchors the binder, and thus the silicon particles, together. —MSL

Science, this issue p. 279;
see also p. 250



Disintegrated silicon microparticles

IN OTHER JOURNALS

Edited by **Caroline Ash**
and **Jesse Smith**



Parasitoid wasps have evolved venoms for host control.

QUANTUM COMPUTING

Making a quantum-classical hybrid

Predicting the dynamics of many-body quantum systems is a formidable computational task, in which quantum computers could come to the aid of classical ones. However, the corrections needed to keep errors in check as a quantum computer works require enormous quantum resources. Li and Benjamin propose a hybrid quantum-classical computer based on variational principles. In the proposed system, the classical computer does most of the work and “outsources” to its quantum partner only very specific tasks. This reduces the number of operations that the quantum partner needs to do, allowing it to be less than perfect; the system can efficiently compensate for the quantum

partner’s errors. A numerical simulation of this hybrid system compares it favorably with competing methods. —JS

Phys. Rev. X 7, 021050 (2017).

CLIMATE CHANGE

Get ready, get set, get wet

One of the expected consequences of anthropogenic climate change is the intensification of the hydrological cycle as a result of higher surface air temperatures. A commonly invoked description of how that will happen is “the dry will get drier and the wet will get wetter”—but exactly how much wetter the wet regions will get is difficult to predict. Borodina *et al.* used spatially aggregated observational data of precipitation from 1951 to 2005 to calibrate model outputs

EVOLUTIONARY BIOLOGY

Wasp venom evolution

Parasitoid wasps use venom to immobilize their hosts and manipulate them into providing a suitable environment for the growth of wasp larvae. In response to changes in host ranges and availability, venom genes need to evolve rapidly to maintain efficacy. Martinson *et al.* studied the sequence and expression of venom genes in closely related wasp species to determine how they evolve. The authors found that many of these genes do not evolve through duplication and neofunctionalization, as expected, but rather are the result of co-opting single-copy genes of different functions. Similarly to genes that have lost venom function, these new venom genes are not a consequence of alterations in the gene sequence itself, but instead have modified cis-regulated expression patterns. —CHG

Curr. Biol. 10.1016/j.cub.2017.05.032 (2017).



of historical rainfall. They found that most models underestimate the scale of heavy rainfall in regions with high rainfall intensity, and the land fraction that it covers, suggesting that the wet may get even wetter than has been expected. —HJS

Geophys. Res. Lett. 10.1002/2017GL074530 (2017).

CANCER IMMUNOTHERAPY

A setback for immune checkpoint therapy?

Nivolumab, an immunotherapy drug, has shown unprecedented success at treating patients with certain types of advanced cancer. The U.S. Food and Drug Administration approvals for nivolumab, and other drugs like it, are for patients with advanced cancer that has progressed or relapsed while on chemotherapy. Carbone *et al.*

tested whether nivolumab could be used as a first-line therapy (before chemotherapy) in lung cancer patients that express the nivolumab target, PD1, and unexpectedly found that the drug was not better than chemotherapy. Compared with chemotherapy, nivolumab did not extend the time before the disease progressed, nor did it improve overall survival. These results suggest that pretreatment with chemotherapy may influence the response to nivolumab. —GKA

N. Engl. J. Med. 376, 2415 (2017).

POPULATION GENETICS

Evolutionarily, the beat goes on

Genetic variants affecting heart development and function, such as those associated with coronary artery disease (CAD),

are subject to rapid removal from the gene pool. Thus, it is expected that inherited genes related to CAD should also have positive effects. Byars *et al.* looked for evidence of positive selection in genes previously associated with CAD in populations across the globe. Selection signals were seen in many variants and populations, some of which were associated with the number of offspring. Thus, genetic variants that are linked to disease may also affect other traits that could affect persistence within a population. —LMZ

PLoS Genet. 13, e1006328 (2017).

COGNITIVE SCIENCE

Babies favor facelike stimuli before birth

Babies at birth show a preference for facelike stimuli—for instance, a triad of dots configured in a top-heavy manner like a face. Reid *et al.* show that this predisposition does not require any postnatal experience. Visual stimuli were projected through the mothers' abdomens to human fetuses in the third trimester of pregnancy. Using four-dimensional ultrasound technology, the authors saw that fetuses are more likely to turn their heads to look at a facelike configuration of three dots than an inverted

dot configuration. It has often been assumed that no visual experience takes place before birth. A baby's perceptual bias toward faces may be innate or generated by prenatal visual experiences in the womb, rather than rapidly learned after birth. —ECM

Curr. Biol. 27, 1825 (2017).

PHOTOCHEMISTRY

A rhodium catalyst hogs the spotlight

Photochemistry offers an efficient route to constructing four-membered carbon rings, but the product geometry is hard to control precisely. Even though catalysts can selectively orient the reacting partners, it is hard to outpace the unselective background reaction stimulated by catalyst-free light absorption. Huang *et al.* devised a chiral rhodium catalyst that enhanced the intrinsic blue light absorption of imidazole-substituted enones by more than 100-fold, thereby accelerating their [2+2] reaction with dienes and styrene derivatives. The acceleration was sufficient to achieve 92 to 99% enantiomeric excess in a wide variety of cyclobutane products, several of which bore contiguous quaternary stereocenters. —JSY

J. Am. Chem. Soc. 10.1021/jacs.7b04363 (2017).



Unborn babies notice facelike images.

Making a quantum-classical hybrid

Jelena Stajic

Science **357** (6348), 264.

DOI: 10.1126/science.357.6348.264-b

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